

ABSTRACT OF THE DISCLOSURE

A force feedback interface having isotonic and isometric control capability coupled to a host computer that displays a graphical environment such as a GUI. The interface includes a user manipulatable physical object movable in physical space, such as a mouse or puck. A sensor detects the object's movement and an actuator applies output force on the physical object. A mode selector selects isotonic and isometric control modes of the interface from an input device such as a physical button or from an interaction between graphical objects. Isotonic mode provides input to the host computer based on a position of the physical object and updates a position of a cursor, and force sensations can be applied to the physical object based on movement of the cursor. Isometric mode provides input to the host computer based on an input force applied by the user to the physical object, where the input force is determined from a sensed deviation of the physical object in space. The input force opposes an output force applied by the actuator and is used to control a function of an application program, such as scrolling a document or panning or zooming a displayed view. An overlay force, such as a jolt or vibration, can be added to the output force in isometric mode to indicate an event or condition in the graphical environment.

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